



**Palestine Polytechnic University  
College of Engineering**

**Action Research Tool (ART)**

**Prepared By:**

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## **1 Abstract**

This report reflects the learning outcomes of the intensive course “Improving Teaching and Learning Skills” taken at the Centre of Excellence in Teaching and Learning. It considers diagnosing a problem that appeared to be an obstacle to students and treating it using one or more interactive approaches to teaching. Therefore, the participants in this report are the researcher (me) and the students.

The first section in this report defines the problem and explains the importance of treating it. The second section provides the data that show the presence of the problem with 66% of students who were not able to achieve the learning outcome. The methodology followed to treat the problem is presented in third section. Finally, section four tests the effectiveness of the followed methodology that reduced the previous percentage to 10%. At the end of this report a discussion is built upon the results in the conclusion.

## **2 Problem Definition**

Throughout my experience as an instructor in the faculty of engineering, I taught a fundamental course to building engineering students, this course is Engineering Mechanics Statics which is the basic course that introduces students to Mechanics of Materials and Structural Analysis. One of the main intended learning outcomes in Statics is to identify the different types of structural supports and their functions, then to compute the numerical values for them under different loading patterns. The biggest challenge for students comes when it is required to draw the free body diagram (FBD) for the structural support based on its function, the FBD is an analytical model to represent the real loading case upon which the numerical value is determined.

The importance of this learning outcome is that the design of many structural elements in a building depends on finding the numerical values for the supports that support the structure. Therefore, deep understanding is required to insure that students have the ability to understand the higher level of knowledge that is based on statics course.

The next section shows the data based on which the problem is defined.

### 3 Pre-action Data Collection

The problem is identified after marking the first exam which examines the achievement of this learning outcome. Out of 188 students, the number of the students who reflected complete knowledge was 30, representing 16% of the students. Figure 1 shows the results collected based on the first exam.

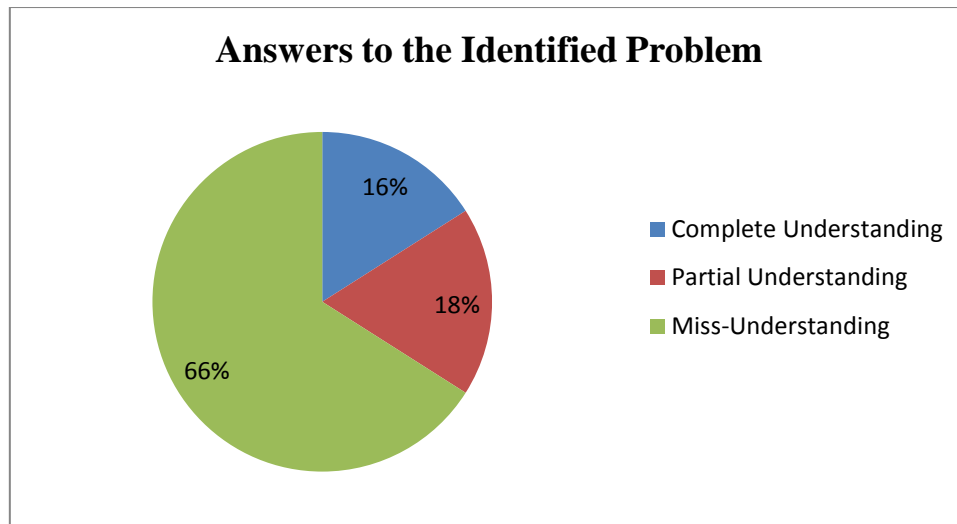


Figure 1: Pre-action Data Collection

### 4 Problem Solving Strategy

Figure 2 shows the methodology followed to treat the previously identified problem.

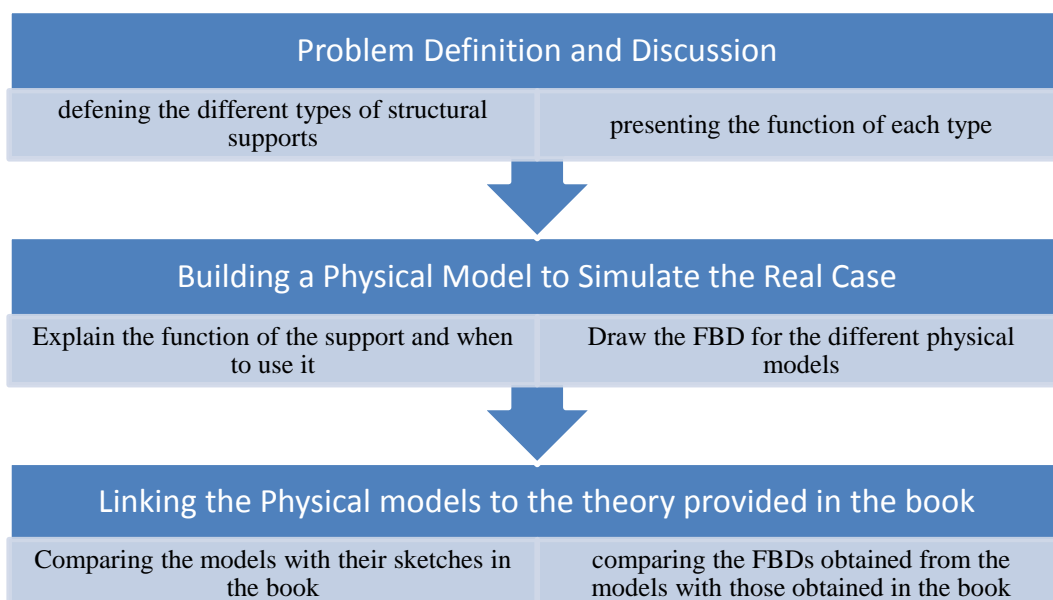


Figure 2: Action Methodology

Figure 3 shows the sketches provided by the book and photos for the built physical models.







Structural Support	Physical Model
 <p style="text-align: center;">roller</p> <p>The connection point on the bar can not move downward.</p>	
 <p style="text-align: center;">pin</p> <p>The joint can not move in vertical and horizontal directions.</p>	
 <p style="text-align: center;">fixed support</p> <p>The support prevents translation in vertical and horizontal directions and also rotation, Hence a couple moment is developed on the body in that direction as well.</p>	

Figure 3: Theoretical Vs. Built Models

## 5 Post-action Data Collection

After using the physical models as teaching tools, the final exam contained a problem that tests the structural supports which was used as a measure to the effectiveness of this approach. The results were very satisfying as shown in Figure 4.

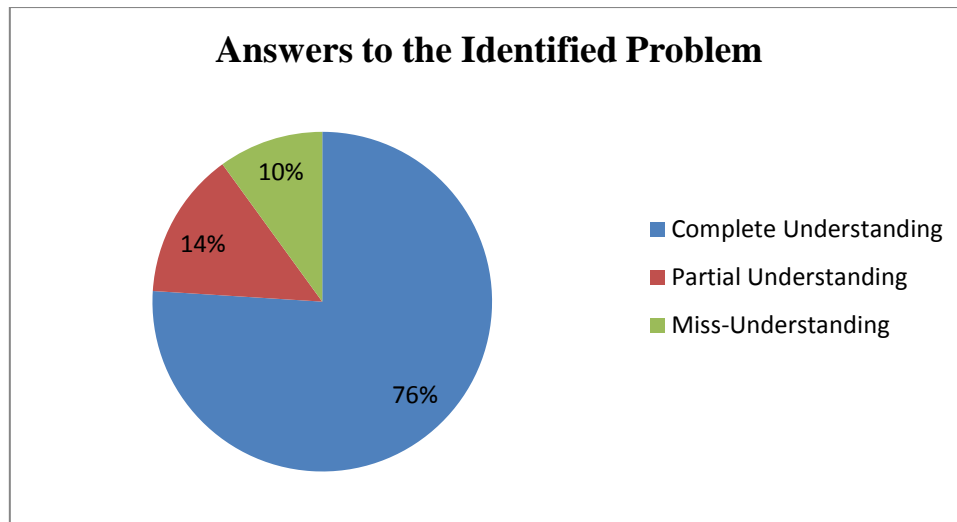


Figure 4: Post- action Data Collection

## 6 Conclusion

After exploring the results of this report, the following conclusion is derived.

- Instructors at a high education level considered a key factor that contributes to the quality of programmes offered by higher education institutions, which the civil society is increasingly concerned about.
- Institutions should implement teaching and evaluation methods that identify and reflect their vision.
- The diversity in teaching methods, such as the physical models in this report, leads to a better delivery of information to the audience.
- Action research tool is a good measure of identifying and solving problems that appear during teaching. Also it enhances communication tools to gather teacher and student suggestions

## 7 References

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